

# **E-COMMERCE WEBSITE**

**Report By**

**Aditya Devkar : AF04970368**

# Index

<b>Sr no</b>	<b>topic</b>	<b>Page no</b>
1	TITLE OF PROJECT	1
2	Acknowledgement	3
3	Abstract	4
4	Introduction	5
5	System Analysis	8
6	System Design	27
7	Screenshots	31
8	Implementation	37
9	Testing	41
10	Results and Discussion	45
11	Future Scope	48
12	Bibliography and References	50

## **ABSTRACT**

Multivendor e-commerce platforms are online marketplaces that allow multiple sellers to offer their products or services through a single website or application. These platforms facilitate a diverse shopping experience by enabling various vendors to list their products, set prices, manage inventory, and process orders independently while sharing a unified customer base. The platform provider typically manages the website's infrastructure, payment processing, and overall user experience, ensuring a seamless transaction process for both buyers and sellers. This business model benefits vendors by offering a broader audience reach without the need to establish their own e-commerce site and provides customers with a wide variety of products from different sellers in one convenient location. The success of multivendor e-commerce platforms depends on factors like vendor management, user-friendly interfaces, efficient logistics, and secure payment gateways

## **Acknowledgements**

I would like to express my sincere gratitude to everyone who contributed to the development of this multivendor e-commerce platform. First and foremost, I am thankful to my mentors and advisors for their valuable guidance, insights, and continuous support throughout this project. Their expertise was instrumental in shaping the ideas and strategies that made this platform possible.

I would also like to acknowledge the dedication and efforts of the entire development team whose technical skills and commitment ensured the successful implementation of this platform. Your hard work and innovative approach to problem-solving were crucial in overcoming the challenges faced during the development process.

A special thanks to the vendors and users who provided valuable feedback during the testing phase, helping us refine and improve the platform to meet their needs effectively. Your input has been invaluable in creating a user-friendly and efficient e-commerce solution.

Lastly, I am grateful to my family and friends for their unwavering encouragement and support, which motivated me to strive for excellence throughout this journey. Without all of your contributions, this project would not have been possible. Thank you.

# CHAPTER 1 INTRODUCTION

## 1.1 Background

The background of a multi-vendor e-commerce platform using the MERN stack involves understanding the context, requirements, and key motivations behind building such a system. A multi-vendor e-commerce platform is a type of online marketplace that allows multiple independent vendors to list and sell their products to customers on a single platform. Unlike a traditional e-commerce site, where a single company sells products, this model supports various sellers operating in one marketplace, similar to popular platforms like Amazon, eBay, or Etsy.

## 1.2 Objectives

This section outlines the primary goals and objectives of the multivendor e-commerce project. It defines what the project intends to accomplish by creating this platform. The objectives might include:

- **Provide a Unified Platform:** To create a centralized online marketplace that enables multiple vendors to list and sell their products easily.
- **Enhance Customer Experience:** To offer a wide variety of products to customers, giving them more choices and better deals in one place.
- **Support Small Businesses:** To empower small and medium-sized businesses by providing them with an affordable and efficient way to reach a larger customer base without the need to create their own e-commerce sites.
- **Increase Sales Opportunities:** To maximize sales by attracting diverse vendors and offering a broader product range to consumers.

## 1.3 Purpose, Scope, and Applicability

This section defines the purpose, scope, and applicability of the multivendor e-commerce project. It helps clarify the boundaries of the project and its intended use.

### 1.3.1 Purpose

The purpose of the multivendor e-commerce project is to develop a comprehensive platform that connects multiple vendors with customers, allowing sellers to showcase their products and buyers to access a wide variety of items in a single location. The platform aims to simplify the

buying and selling process by integrating key features like product listings, order management, secure payments, and efficient logistics.

### 1.3.2 Scope

The scope of this project includes the following key aspects:

- **Platform Development:** Building a robust and scalable web application that supports multiple vendors and allows them to manage their own shops independently.
- **Vendor Management System:** Implementing a user-friendly vendor dashboard where sellers can list products, track inventory, manage orders, and handle customer inquiries.
- **Customer Experience:** Creating a seamless user interface for customers to search, browse, and purchase products from different vendors.
- **Payment Integration:** Integrating secure payment gateways to handle transactions between customers and vendors.
- **Logistics and Delivery:** Collaborating with delivery partners to manage the shipping and logistics of products sold on the platform.
- **Technical Support and Maintenance:** Ensuring ongoing technical support, updates, and maintenance to keep the platform running smoothly.

### 1.3.3 Applicability

The multivendor e-commerce platform is applicable to a wide range of businesses and industries, including:

- **Retail Businesses:** Suitable for small to large-scale retailers looking to reach a broader audience through an online marketplace.
- **Handmade Goods and Artisans:** Artisans and small-scale creators can use this platform to sell their handmade products.
- **Electronics and Gadgets:** Vendors dealing in electronics can showcase their items to tech-savvy customers in one unified marketplace.
- **Fashion and Apparel:** Clothing and accessories sellers can benefit from the extensive customer base of the multivendor e-commerce platform.
- **Local and Global Markets:** The platform is designed to cater to both local vendors and those aiming to sell internationally, depending on their business needs.

## 1.4 Achievement

This section will discuss the key achievements of the multivendor e-commerce project. It highlights the successful outcomes that were accomplished through the development and implementation of the platform. Achievements may include:

- **Increased Vendor Participation:** Successfully onboarded a diverse range of vendors from various industries, increasing the variety of products available to customers.
- **Enhanced User Experience:** Developed an intuitive and user-friendly interface that has been well-received by both vendors and customers, leading to higher engagement and satisfaction rates.
- **Revenue Growth:** Achieved significant growth in sales and revenue for both the platform and its participating vendors.
- **Positive Feedback:** Received favorable reviews and testimonials from users regarding the ease of use, product selection, and secure transaction process.
- **Scalability and Flexibility:** Built a platform that is scalable, allowing for the integration of new vendors and expansion into new markets without compromising performance.
- **Operational Efficiency:** Streamlined the logistics and order fulfillment processes, resulting in faster delivery times and reduced operational costs.

## CHAPTER 2 SURVEY OF TECHNOLOGIES

This section focuses on the different technologies used in developing a multivendor e-commerce platform. Understanding these technologies is crucial for building a robust, secure, and scalable system that efficiently handles the needs of both vendors and customers. Here, we will explore the key technologies that are typically employed in the design and implementation of a multivendor e-commerce platform.

## 2.1. Frontend Technologies

The frontend of a multivendor e-commerce platform is responsible for delivering a smooth and interactive user experience. It includes the design and user interface (UI) elements that customers and vendors interact with. Some of the commonly used frontend technologies are:

- **HTML (HyperText Markup Language):** Used for creating the structure of web pages, HTML forms the backbone of the website, organizing content and defining its layout.
- **CSS (Cascading Style Sheets):** Used to style the HTML elements, CSS makes the website visually appealing by handling design aspects like colors, fonts, and layouts.
- **JavaScript:** A powerful scripting language used to add interactivity and dynamic features to the platform, such as animations, product filters, and instant search.
- **Frontend Frameworks (React, Angular, or Vue.js):**
  - **React:** A JavaScript library developed by Facebook that is widely used for building dynamic and responsive user interfaces. It provides fast rendering and enhances the user experience.
  - **Angular:** A popular frontend framework maintained by Google, known for its powerful tools for building single-page applications (SPAs) and complex ecommerce platforms.



## 2.2. Backend Technologies

The backend of the multivendor e-commerce platform handles the server-side logic, database management, and communication with the frontend. It processes requests, manages data, and ensures smooth operation of the platform. Key backend technologies include:

- **Programming Languages (React.js, Node.js):**

- **Node.js:** An open-source, cross-platform runtime environment that enables JavaScript to be used for server-side scripting, offering fast processing and scalability.
- **React.js:** React.js is a popular open-source JavaScript library developed by Facebook for building user interfaces, particularly single-page applications (SPAs). It allows developers to create reusable UI components that manage their own state.

- **Backend Frameworks (MongoDB, Express.js):**

- **Express.js (Node.js):** A minimalist web framework for Node.js that offers robust routing, middleware support, and integration with various services.
- **MongoDB:** A NoSQL database that stores data in flexible, JSON-like documents. It is well-suited for handling unstructured data, making it a good fit for e-commerce platforms with diverse product catalogs.

# CHAPTER 3 REQUIREMENTS AND ANALYSIS

## 3.1 Problem Definition

- **Existing System:**
  - **Overview:** Describe current e-commerce platforms and their limitations (e.g., lack of vendor support, poor user experience, high fees).
  - **Challenges:** Detail specific pain points users and vendors face, such as lack of trust, limited payment options, or inadequate customer support.
- **Proposed System:**
  - **Overview:** Describe your multivendor e-commerce platform and its key features.
  - **Solutions Offered:** Explain how the new system addresses the existing challenges (e.g., better user interface, enhanced security, lower transaction fees).

## 3.2 Requirement Specification

- **Background:**
  - Explain the context for developing the multivendor platform. Discuss market trends, target audience, and user expectations.
- **Objectives:**
  - List the main objectives of the platform:
    - Create a seamless shopping experience for customers.
    - Enable vendors to easily manage their products and sales.
    - Provide robust admin functionalities for monitoring and support.

### 3.3 Planning and Scheduling

- **Gantt Chart:**

- Include a Gantt chart outlining the project timeline, major phases (e.g., planning, design, development, testing, deployment), and key milestones. Tools like Microsoft Project or online Gantt chart makers can be used to create this.



### 3.4 Hardware and Software

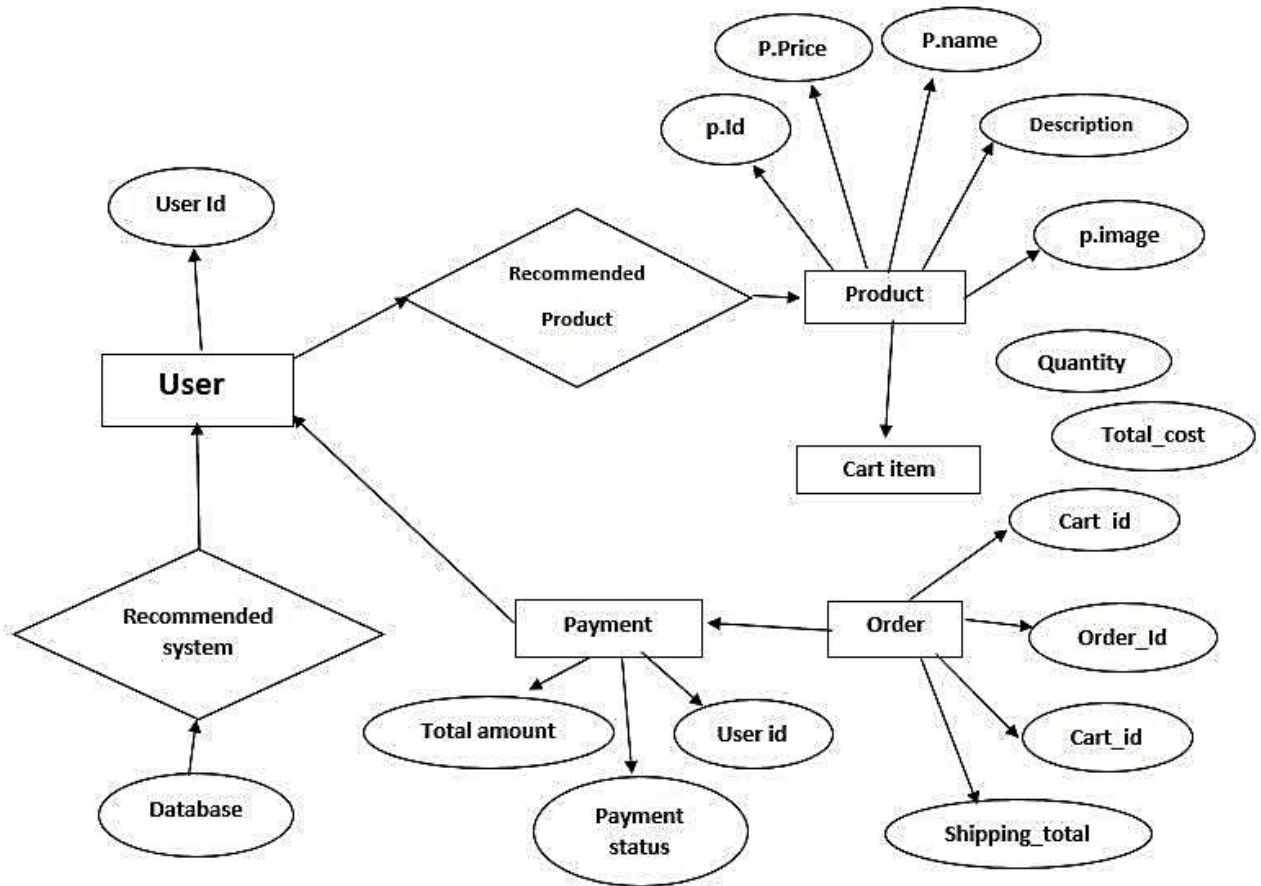
- **Hardware Requirements:**
  - Specify the server specifications (CPU, RAM, storage) needed for hosting the application.
  - Outline any local development machine specifications.
- **Software Requirements:**
  - **Frontend:** React.js, HTML, CSS. ○ **Backend:** Node.js, Express.js, MongoDB. ○  
**Development Tools:** Code editors (e.g., VS Code), version control (e.g., Git).
  - **Testing Tools:** Jest, Mocha, etc.

### 3.5 Preliminary Product

- **Description:**
  - Provide an overview of the preliminary version of the product. Highlight the core functionalities that will be included in the first release.
- **Prototype:**
  - Include any mockups or wireframes that visually represent the initial design and layout of the platform.

### 3.6 Conceptual Models

#### 3.6.1 ER-Diagram

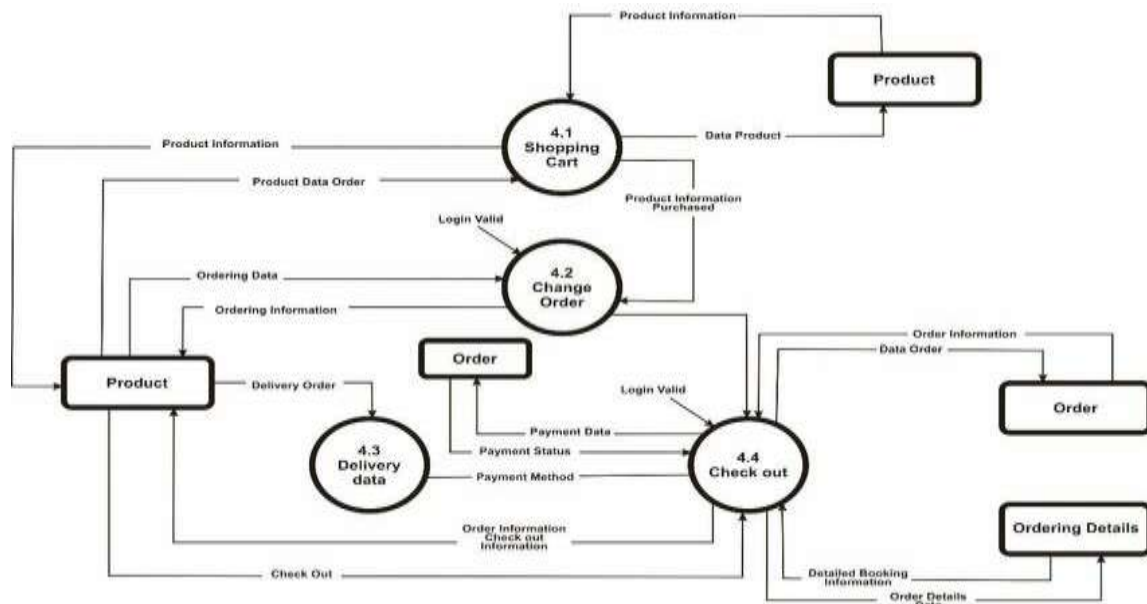


### 3.6.2 Data Flow Diagram

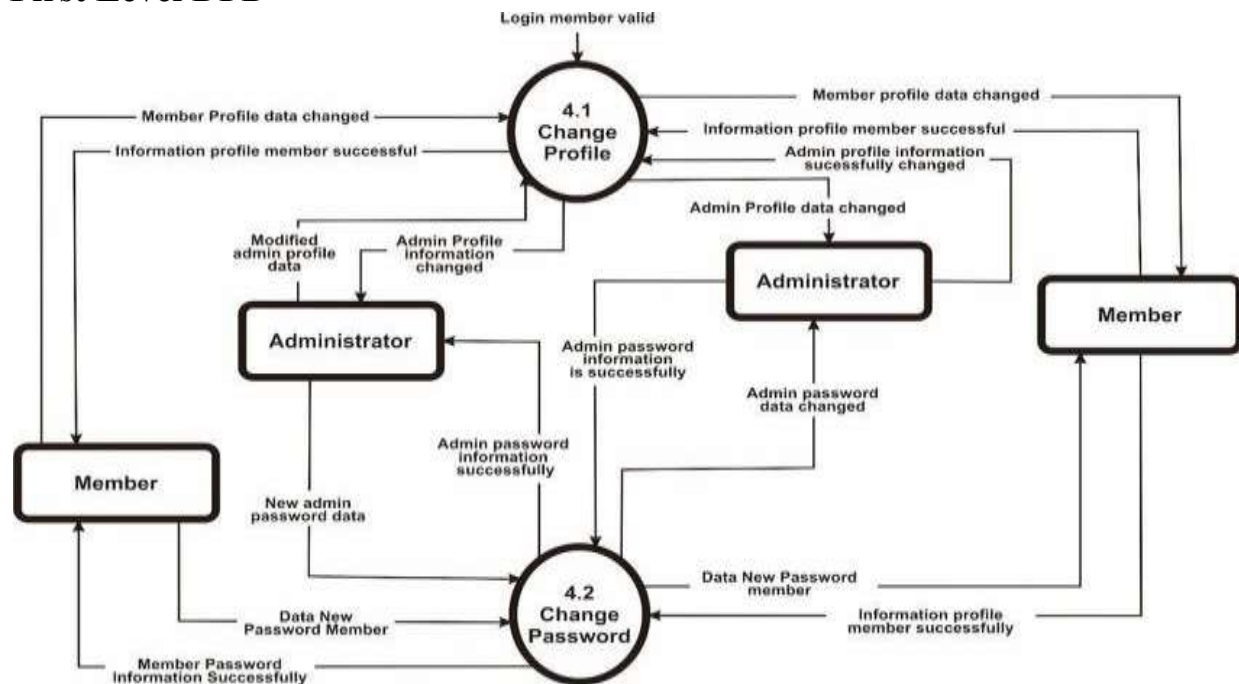
- **Data Flow Diagram (DFD):**

- Create a DFD that shows how data moves within the system. Identify processes, data stores, and external entities.

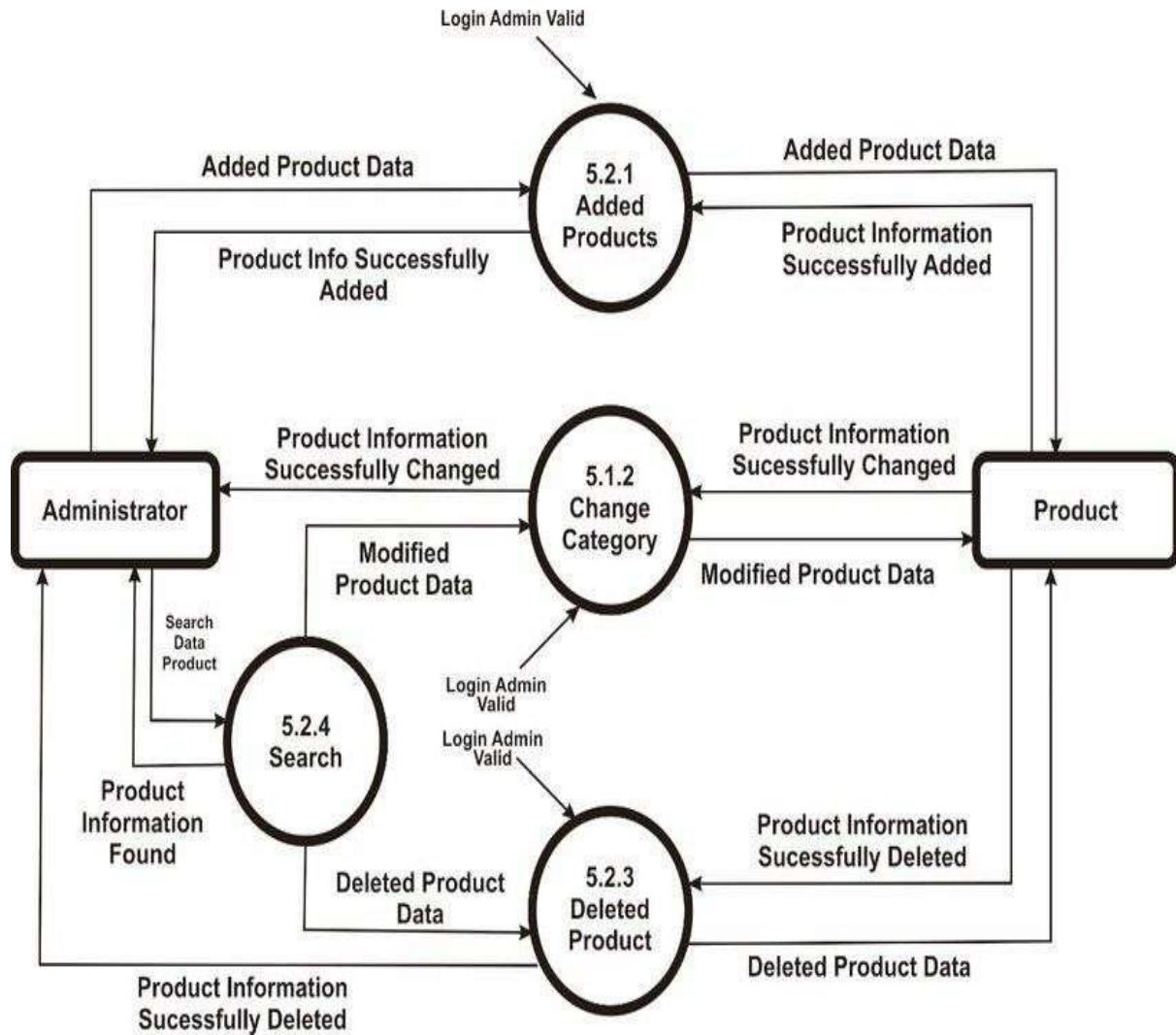
#### Zero Level DFD



#### First Level DFD



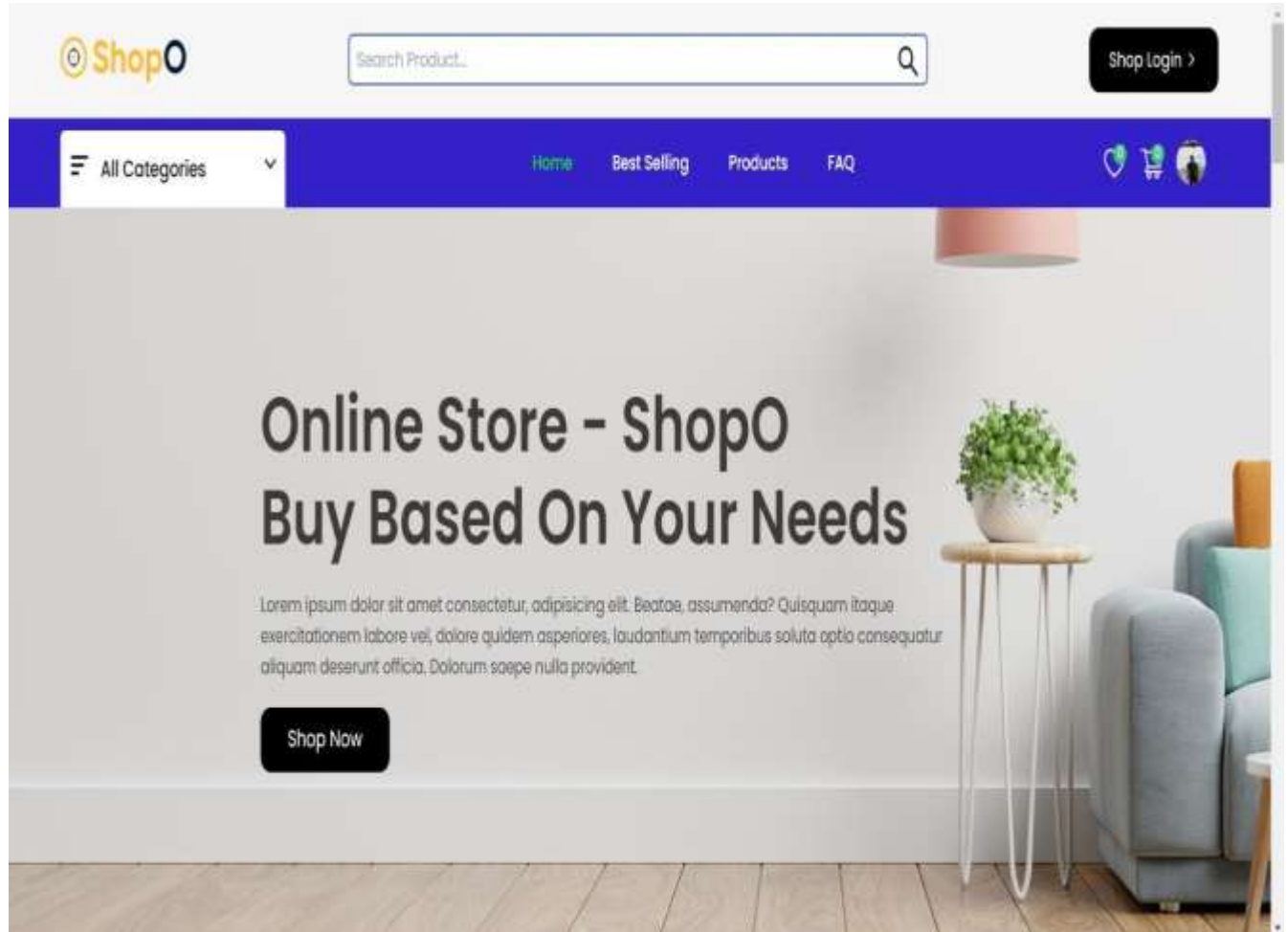
## Second Level DFD



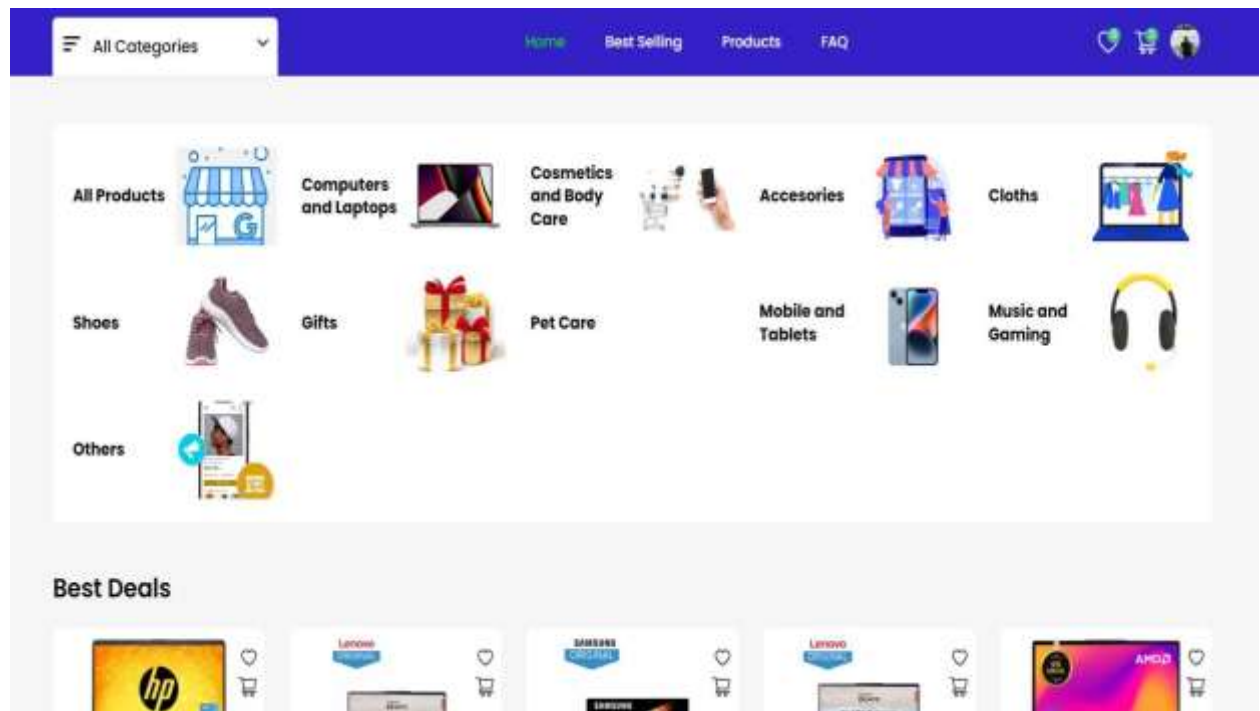
## CHAPTER 4 SYSTEM DESIGN

## 4.1 Basic Modules

### 4.1.1 ON BOARDING PAGE







## Best Deals

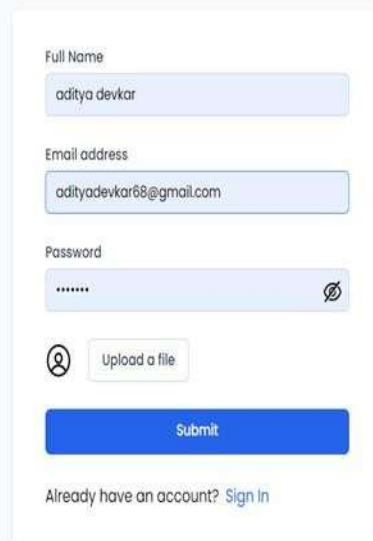
 shop  	 shop  	 shop  	 shop  	 shop  
HP i5s Intel Core i3 12th Gen 1215U	Lenovo IdeaPad Slim 3 Intel Core i5 12th...	SAMSUNG Galaxy Book4 Intel Core i5 13th ...	Lenovo IdeaPad Slim 3 Intel Core i5 12th...	Acer Aspire 3 Backlit AMD Ryzen 7 Octa C...
☆☆☆☆☆	☆☆☆☆☆	☆☆☆☆☆	☆☆☆☆☆	☆☆☆☆☆
\$457 <del>\$599</del> 0 sold	\$598 <del>\$699</del> 0 sold	\$548 <del>\$699</del> 0 sold	\$649 <del>\$799</del> 0 sold	\$499 <del>\$599</del> 0 sold

## Popular Events

No Events have!

## Featured Products

### 4.1.2 REGISTRATION PAGE




A registration form with a light blue background. It contains four input fields: 'Full Name' with the value 'aditya devkar', 'Email address' with 'adityadevkar68@gmail.com', and 'Password' with masked characters '\*\*\*\*\*'. To the right of the password field is an eye icon. Below the password field is a profile icon and a button labeled 'Upload a file'. At the bottom is a blue 'Submit' button and a link 'Already have an account? Sign In'.

Full Name  
aditya devkar

Email address  
adityadevkar68@gmail.com

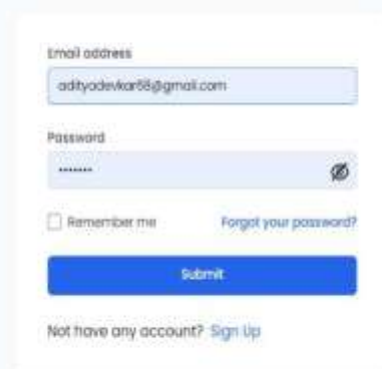
Password  
\*\*\*\*\*

 Upload a file

Submit

Already have an account? [Sign In](#)

### LOGIN PAGE



A login form with a light blue background. It contains two input fields: 'Email address' with the value 'adityadevkar68@gmail.com' and 'Password' with masked characters '\*\*\*\*\*'. To the right of the password field is an eye icon. Below the password field is a checkbox labeled 'Remember me' and a link 'Forgot your password?'. At the bottom is a blue 'Submit' button and a link 'Not have any account? Sign Up'.

Email address  
adityadevkar68@gmail.com

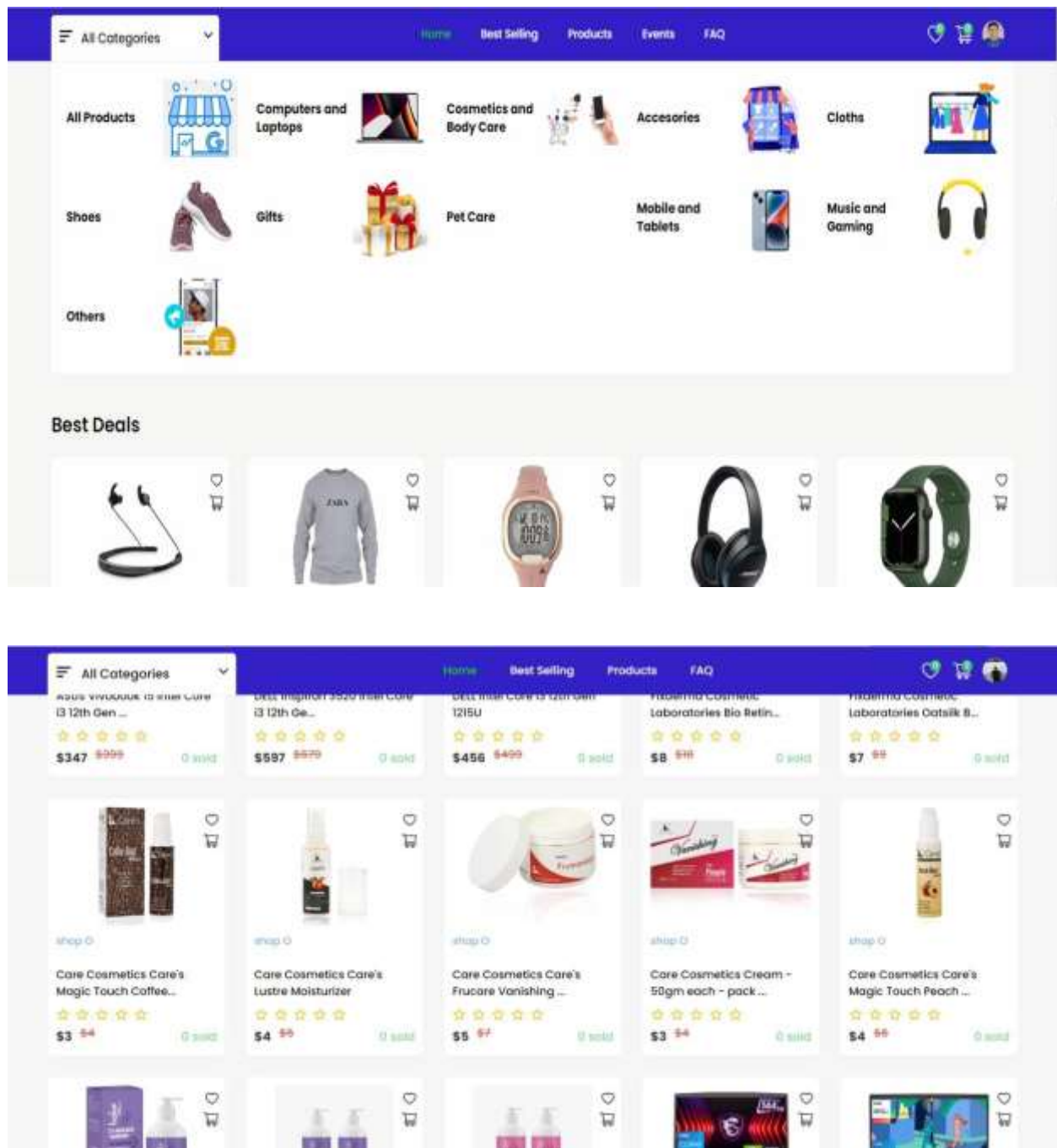
Password  
\*\*\*\*\*

☐ Remember me [Forgot your password?](#)

Submit

Not have any account? [Sign Up](#)

### 4.1.3 USER HOME



#### 4.1.4 ADMIN MASTER HOME

### Administrator

Email address

adhyadevkar453@gmail.com

Password

\*\*\*\*\*

create shop

Forgot your password?

Submit

← → ↻ local:5171/dashboard

Dashboard

All Orders

All Products

Create Product

All Events

Create Event

Withdraw Money

Shop Inbox

Discount Codes

Refunds

Overview

Account Balance (with 30% service charge)

\$29700.00

Withdraw Money

All Orders

5

View Orders

All Products

20

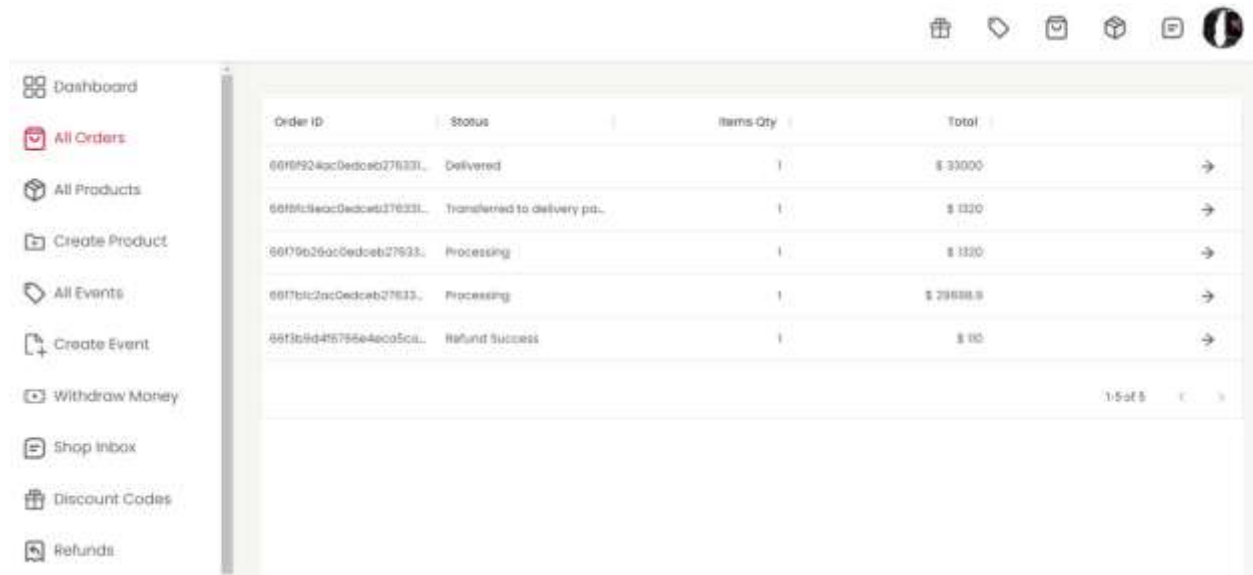
View Products

Latest Orders

Order ID	Status	Items Qty	Total	
66f8f924ac0edceb276331	Delivered	1	\$ 33000	→
66f8fc8aac0edceb276331	Transferred to delivery pa...	1	\$ 1120	→
66f79b26ac0edceb276331	Processing	1	\$ 1120	→
66f7b1c2ac0edceb276331	Processing	1	\$ 29698.9	→
66f3b6d4f6766e4ec95ca1	Refund Success	1	\$ 110	→

20

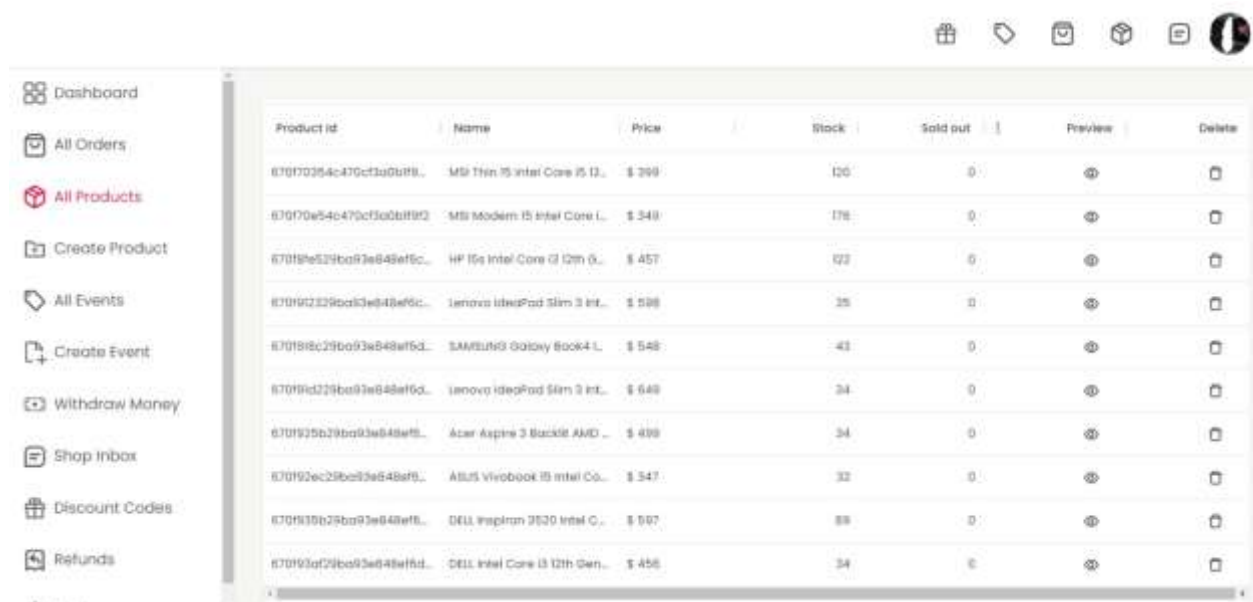
## 4.1.5 ALL Order



Order ID	Status	Items Qty	Total
60f6f924ac0edc0eb276331...	Delivered	1	\$ 33000
60f6f924ac0edc0eb276331...	Transferred to delivery pa...	1	\$ 1320
60f79b29ac0edc0eb276331...	Processing	1	\$ 1320
60f7b1c2ac0edc0eb276331...	Processing	1	\$ 29688.8
60f3b9d45f795e4eca5ca...	Refund Success	1	\$ 00

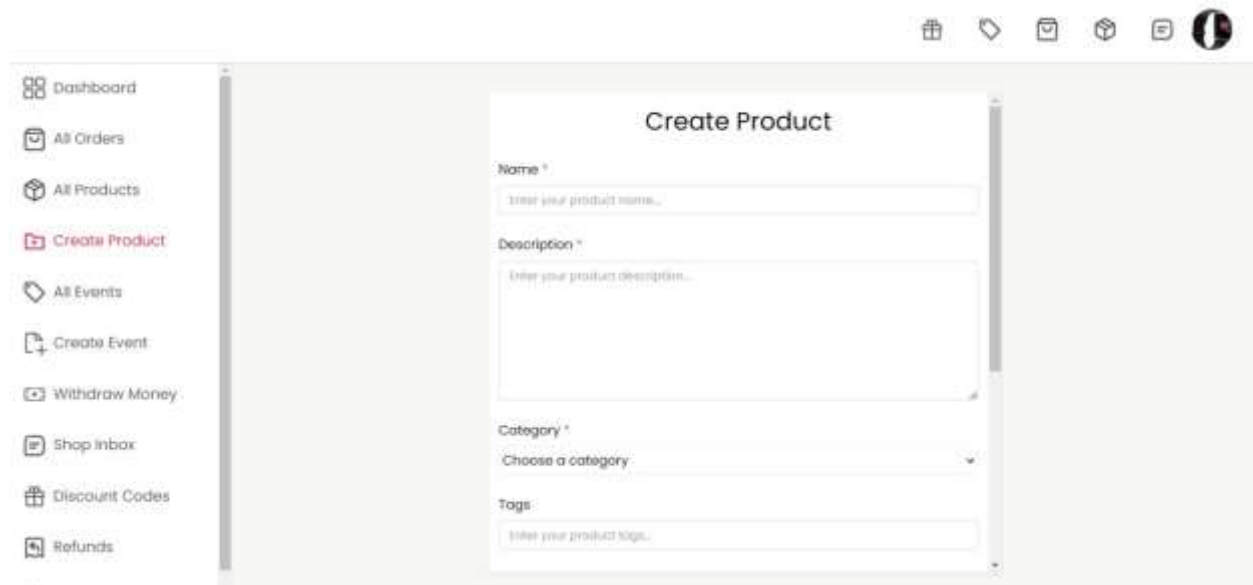
1-5 of 5

## All Product



Product id	Name	Price	Stock	Sold out	Preview	Delete
670f70354c470cf3a0b1f9...	MSI Thin 15 Intel Core i5 12...	\$ 399	120	0		
670f70e54c470cf3a0b1f92...	MSI Modern 15 Intel Core i...	\$ 349	178	0		
670f8e5229ba93e848ef5c...	HP 16s Intel Core i7 12th G...	\$ 457	122	0		
670f912229ba93e848ef5c...	Lenovo IdeaPad Slim 3 Int...	\$ 508	25	0		
670f89c229ba93e848ef5c...	SAMSUNG Galaxy Book4 L...	\$ 548	43	0		
670f91d229ba93e848ef5c...	Lenovo IdeaPad Slim 3 Int...	\$ 649	24	0		
670f925b29ba93e848ef5c...	Acer Aspire 3 Backpack AMD ...	\$ 499	24	0		
670f92ec29ba93e848ef5c...	Alius Vivobook 15 Intel Co...	\$ 347	32	0		
670f930b29ba93e848ef5c...	DELL Inspiron 7520 Intel C...	\$ 507	88	0		
670f93af29ba93e848ef5c...	DELL Intel Core i3 12th Gen...	\$ 456	24	0		

## 4.1.6 Create Product



The screenshot shows a web application interface with a sidebar on the left and a main content area. The sidebar contains a list of navigation items: Dashboard, All Orders, All Products, Create Product (highlighted in red), All Events, Create Event, Withdraw Money, Shop Inbox, Discount Codes, and Refunds. The main content area displays the 'Create Product' form. The form has a title 'Create Product' and four input fields: 'Name \*' (text), 'Description \*' (text area), 'Category \*' (dropdown menu with 'Choose a category' selected), and 'Tags' (text). Each input field has a placeholder text: 'Enter your product name...', 'Enter your product description...', 'Choose a category', and 'Enter your product tags...' respectively. The top right corner of the dashboard shows a row of icons: a gift, a hand, a calendar, a box, a document, and a user profile.

Dashboard

All Orders

All Products

Create Product

All Events

Create Event

Withdraw Money

Shop Inbox

Discount Codes

Refunds

Create Product

Name \*

Enter your product name...

Description \*

Enter your product description...

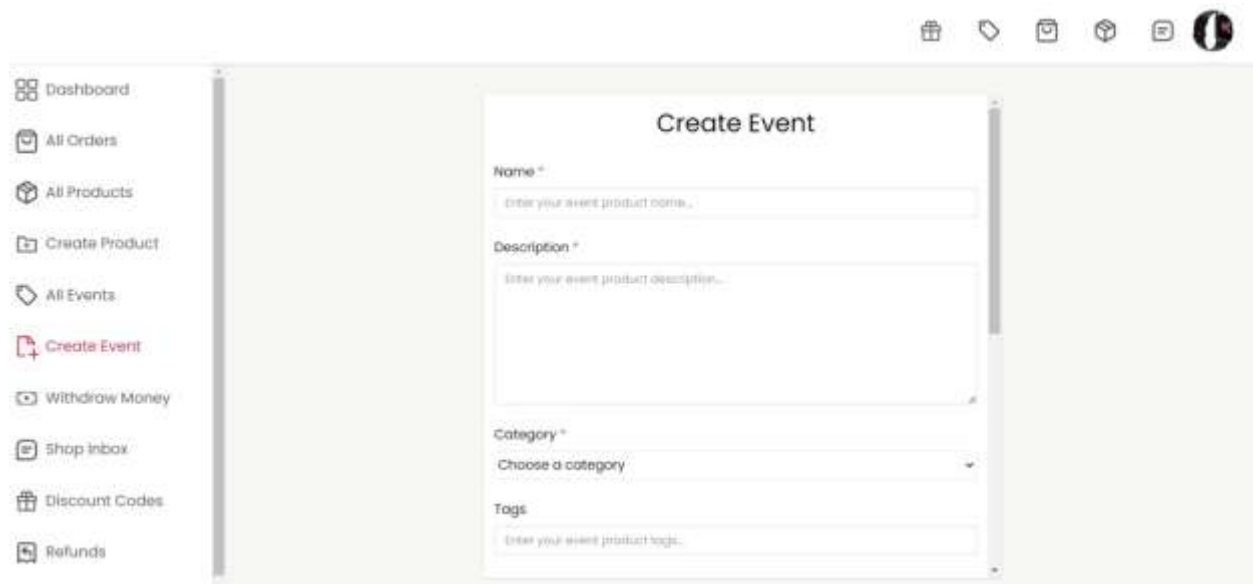
Category \*

Choose a category

Tags

Enter your product tags...

## Create Event



The screenshot shows a web application interface with a sidebar on the left and a main content area. The sidebar contains a list of navigation items: Dashboard, All Orders, All Products, Create Product, Create Event (highlighted in red), All Events, Withdraw Money, Shop Inbox, Discount Codes, and Refunds. The main content area displays the 'Create Event' form. The form has a title 'Create Event' and four input fields: 'Name \*' (text), 'Description \*' (text area), 'Category \*' (dropdown menu with 'Choose a category' selected), and 'Tags' (text). Each input field has a placeholder text: 'Enter your event product name...', 'Enter your event product description...', 'Choose a category', and 'Enter your event product tags...' respectively. The top right corner of the dashboard shows a row of icons: a gift, a hand, a calendar, a box, a document, and a user profile.

Dashboard

All Orders

All Products

Create Product

Create Event

All Events

Withdraw Money

Shop Inbox

Discount Codes

Refunds

Create Event

Name \*

Enter your event product name...

Description \*

Enter your event product description...

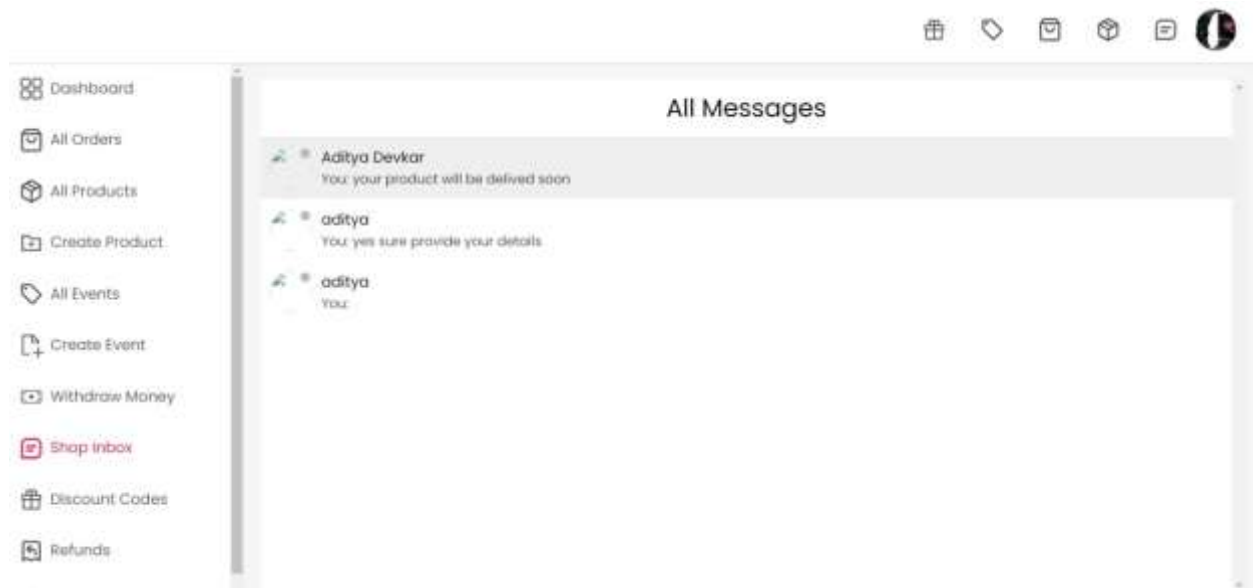
Category \*

Choose a category

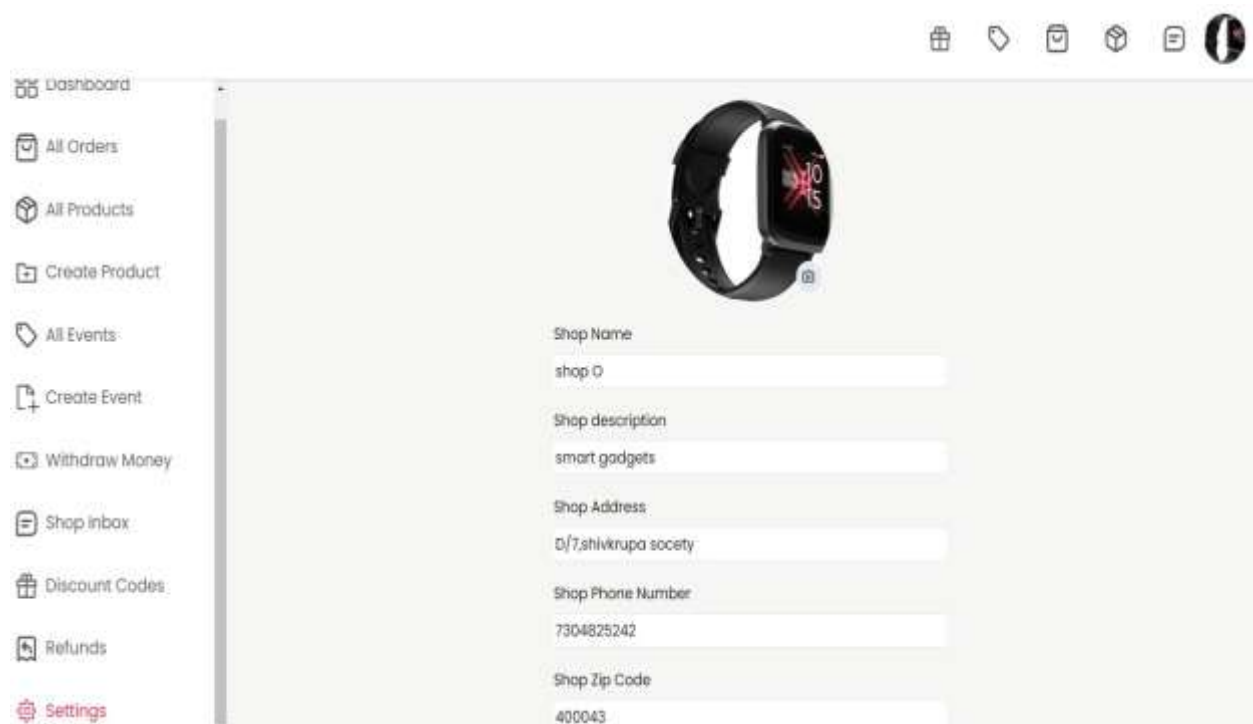
Tags

Enter your event product tags...

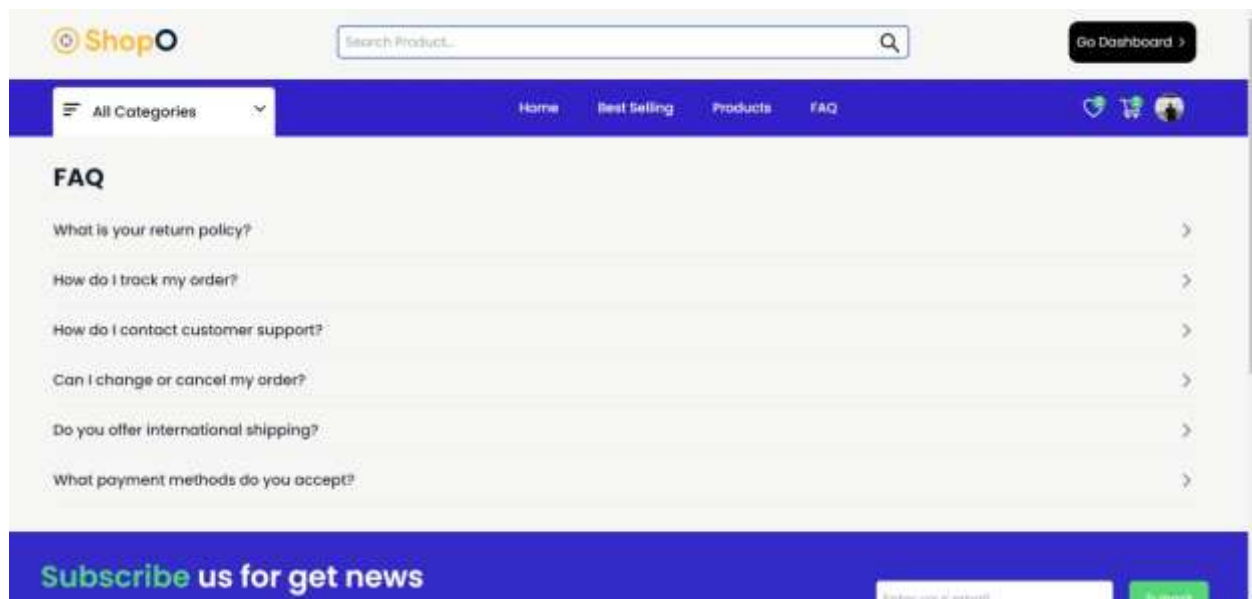
## Shop Inbox



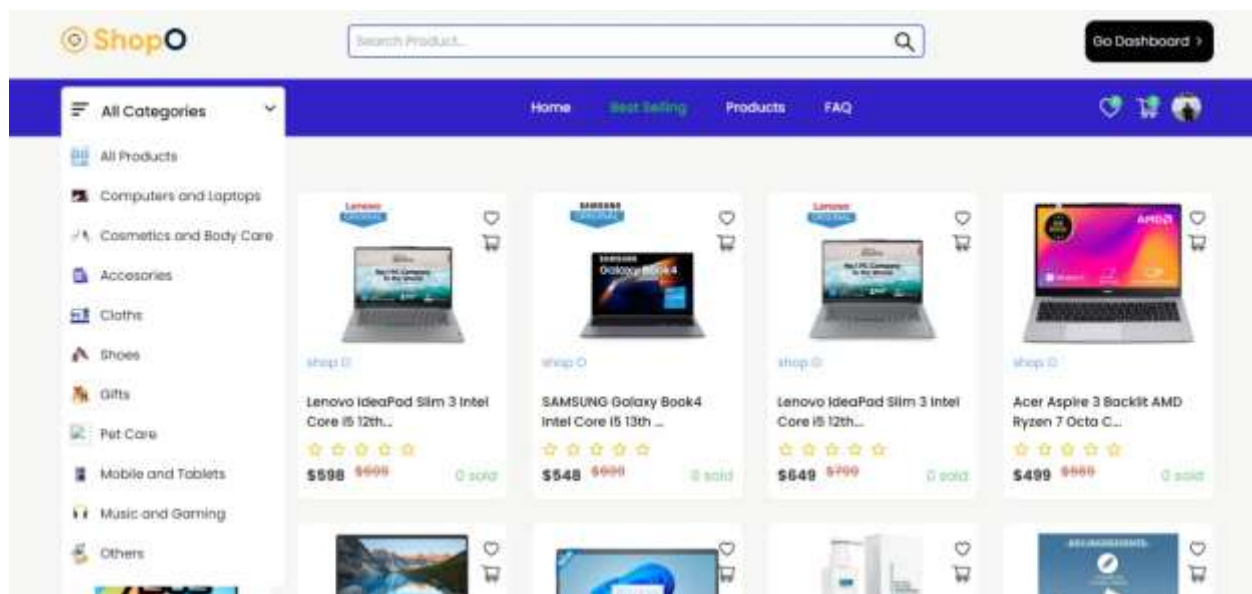
## Update Product



## FAQ



## Categories





#### 4.1.7 ADD PRODUCT

localhost:5173/dashboard/create-product

Dashboard

All Orders

All Products

Create Product

All Events

Create Event

Withdraw Money

Shop Inbox

Discount Codes

Refunds

Settings

Name \*

Enter your product name...

Description \*

Enter your product description...

Please fill out this field.

Category \*

Choose a category

Tags

Enter your product tags...

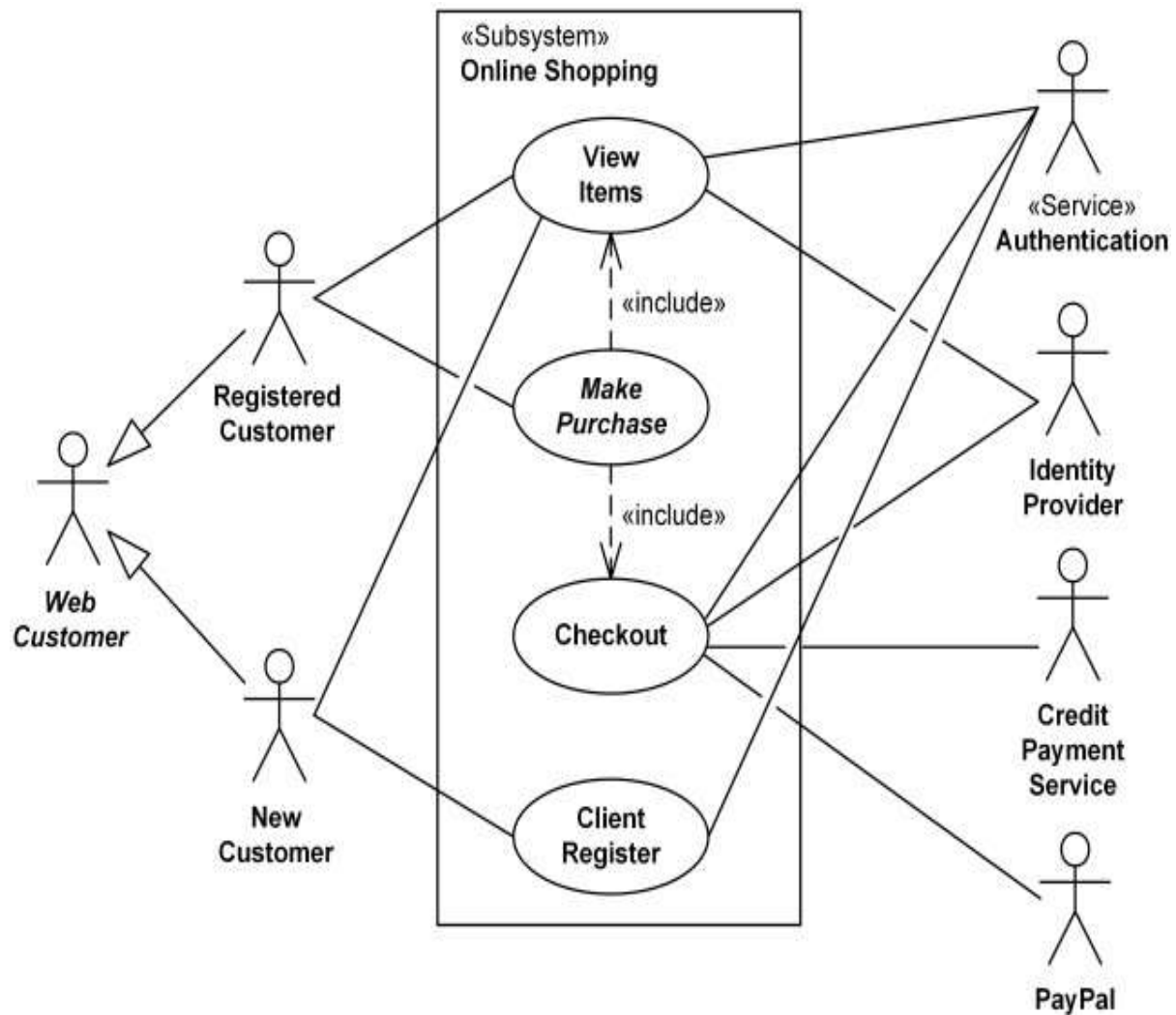
Original Price

Enter your product price...

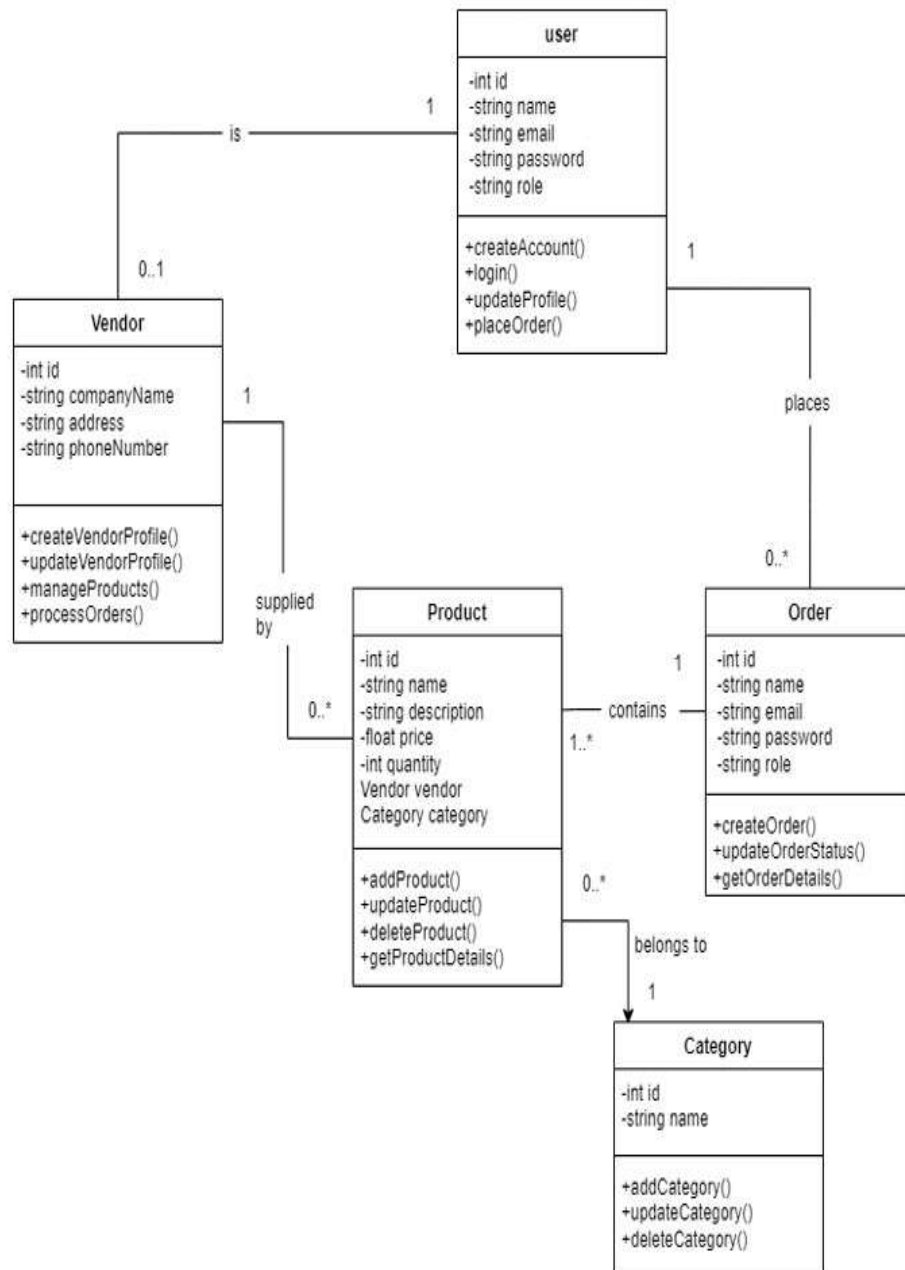
## 4.2 Data Design

### 4.2.1 Schema Design

#### Use Case Diagram



## 4.2.2 Class Diagram



## 4.3 Data Integrity and Constraints

### 1. Data Integrity in Multi-Vendor E-commerce

Data integrity ensures that the information stored in the database remains correct, accurate, and consistent throughout its life cycle. For a multi-vendor e-commerce platform, this involves:

- **Entity Integrity**
  - User Records: Each user (buyer or vendor) should have a unique identifier (userID). This guarantees that every user is uniquely identifiable, preventing duplicate accounts or conflicting records.
  - Product Records: Each product should have a unique identifier (productID) to ensure that products from different vendors can be correctly managed without confusion.
  - Vendor Records: Vendors should have a unique identifier (vendorID) to differentiate between different sellers on the platform.
- **Referential Integrity** ○ Ensures that relationships between data are maintained consistently.
  - For example, a product entry in the Products table must have a valid vendorID that references an existing vendor in the Vendors table.
- **Domain Integrity**
  - Ensures that the values entered into each field fall within a specified range or set of allowable values.
  - Status fields (such as order status or product availability) should have predefined values like "Pending," "Shipped," "Delivered," or "Cancelled."
- **User-Defined Integrity**
  - In a multi-vendor e-commerce platform, specific rules may apply to products, discounts, or inventory.
  - For example, rules can ensure that a vendor cannot set a discount percentage greater than 50% without administrative approval or that out-of-stock products cannot be added to the cart.

## 2. Constraints in Multi-Vendor E-commerce

Constraints are rules applied to database columns to enforce data integrity. Common types of constraints used in a multi-vendor e-commerce platform include:

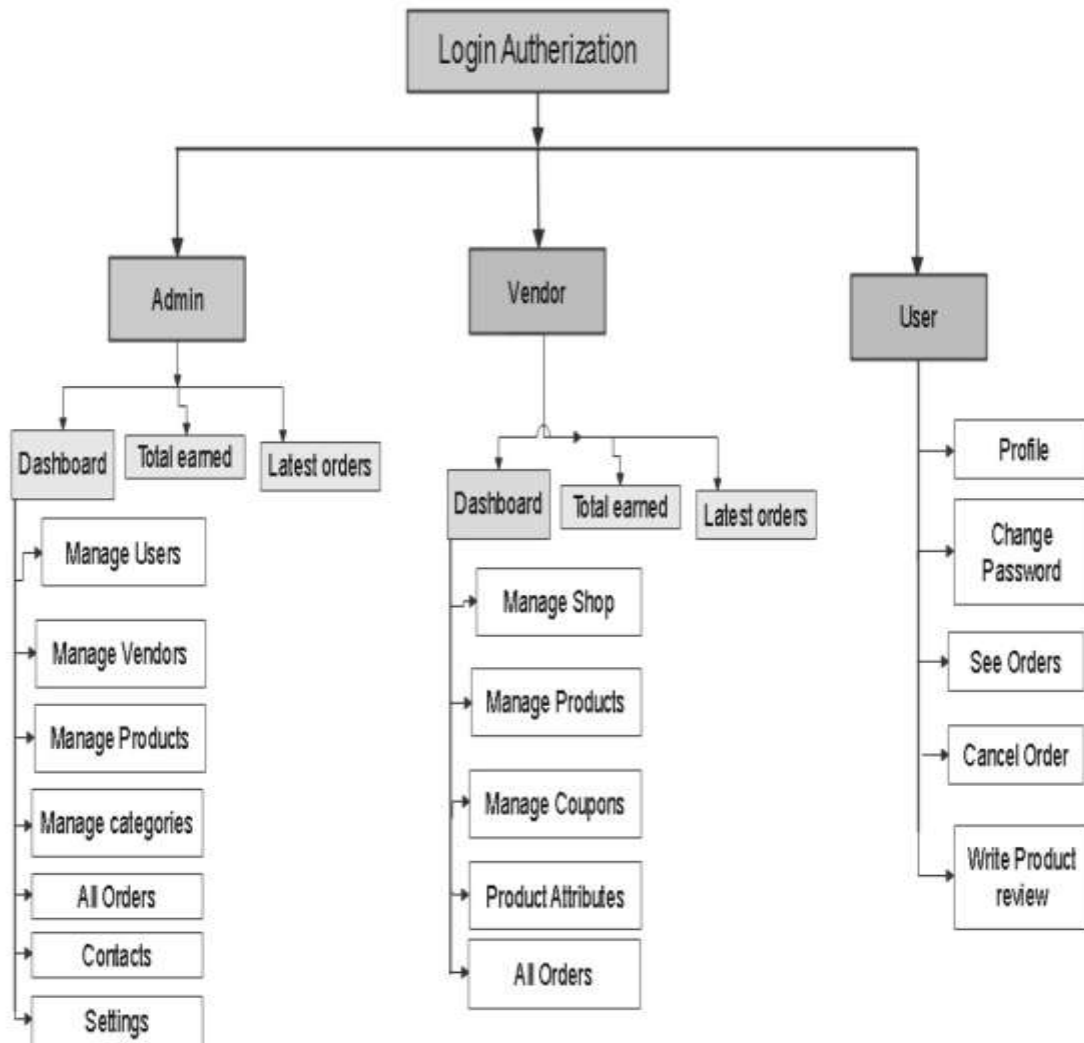
- **Primary Key Constraint**
  - Each table should have a primary key (e.g., userID for Users, vendorID for Vendors, productID for Products) to uniquely identify each record. ○ This ensures that there are no duplicate rows and that each record can be uniquely retrieved.
- **Foreign Key Constraint**
  - Used to link tables together and maintain referential integrity.
  - For example, the vendorID in the Products table should be a foreign key that references the vendorID in the Vendors table, ensuring that each product is linked to a valid vendor.
  - Similarly, the userID in the Orders table should reference the userID in the Users table.
- **Unique Constraint** ○ Ensures that all values in a column are unique. ○ For example, the email field in the Users table should have a unique constraint to prevent multiple accounts from using the same email address.
- **Not Null Constraint** ○ Ensures that certain fields must have a value and cannot be left empty. ○ Fields like username, password, email, productName, and price should have a Not Null constraint because they are essential for transactions.
- **Check Constraint**
  - Used to limit the value range that can be placed in a column. ○ For example, the price of a product should always be greater than zero, or the quantity of products in an order should be a positive integer.

### Importance of Data Integrity and Constraints in Multi-Vendor E-commerce

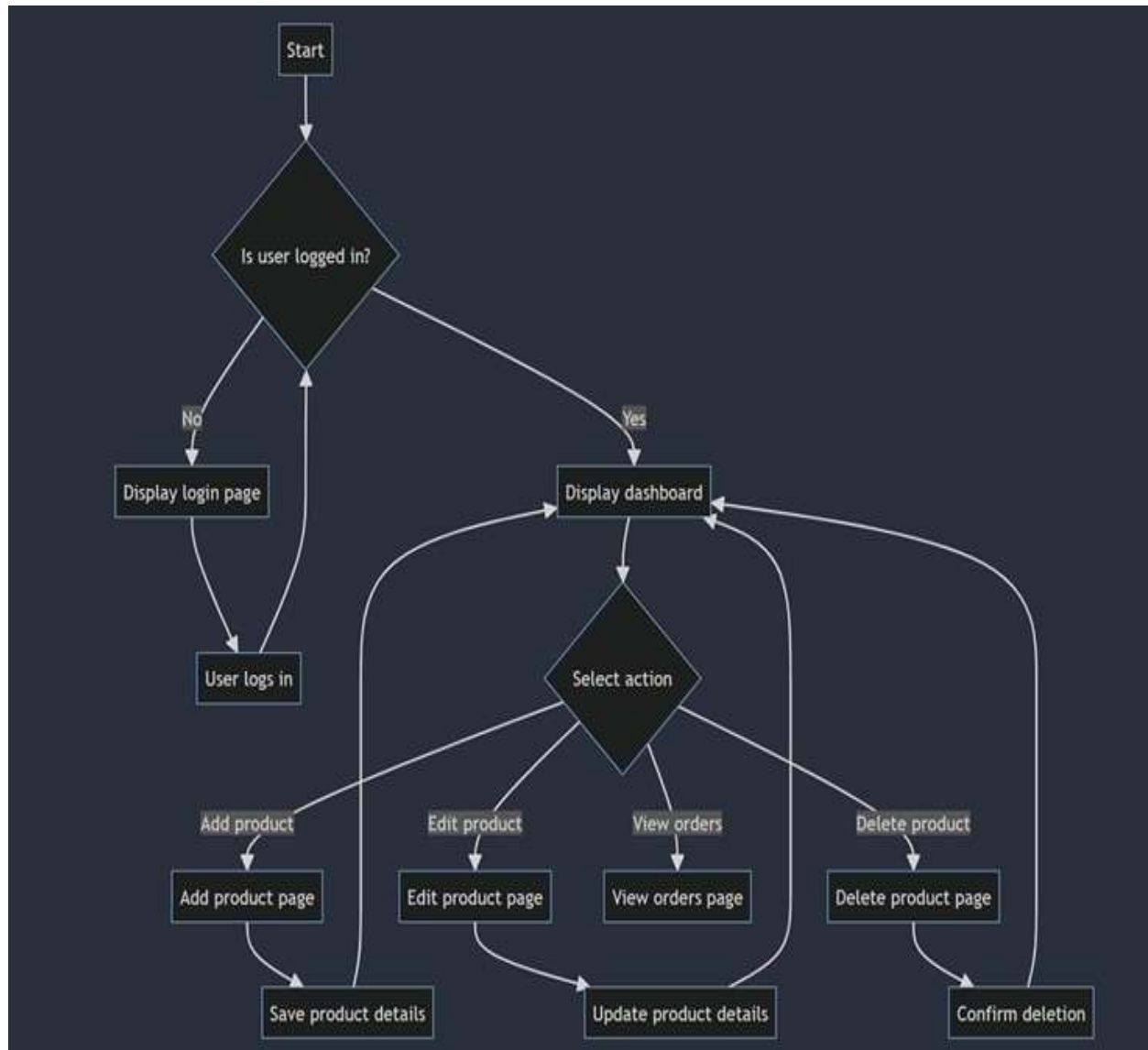
- **Prevent Data Corruption:** Ensuring that invalid data cannot be inserted into the system prevents errors and data corruption.
- **Consistent User Experience:** Guarantees that the displayed information (such as product details and prices) is accurate and up-to-date across the platform.

## 4.4 Logic Diagram

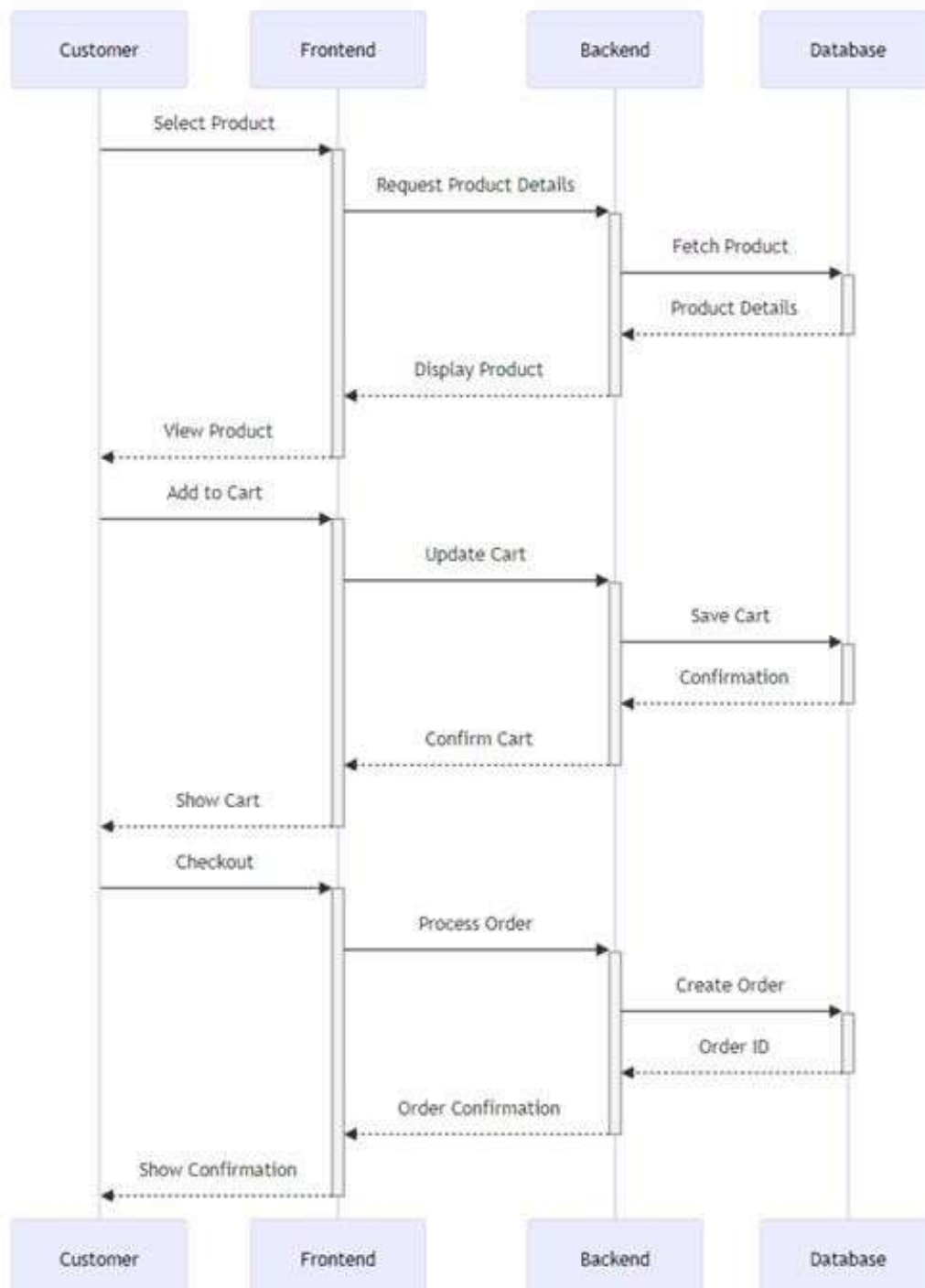
### 4.4.1 Flow Chart Diagram



#### 4.4.2 Activity Diagram



### 4.4.3 Sequence Diagram



### 4.5 Test Case Design and Test Scenarios



## 1.User Registration and Login

Test Case ID	Test Scenario	Test Steps	Expected Result	Status
TC001	Register a new user with valid details	1. Open registration page 2. Enter valid username, email, and password 3. Click on "Register" button	User should be successfully registered, and a success message should appear	Pending
TC002	Register a new user with existing email	1. Open registration page 2. Enter an email that is already registered 3. Click on "Register"	System should display a message saying "Email already exists"	Pending
TC003	Login with valid credentials	1. Open login page 2. Enter registered email and password 3. Click on "Login"	User should be successfully logged in and redirected to the homepage	Pending
TC004	Login with incorrect password	1. Open login page 2. Enter valid email but incorrect password 3. Click on "Login"	Error message "Invalid password" should be displayed	Pending

## 2. Vendor Product Management

Test Case ID	Test Scenario	Test Steps	Expected Result	Status
TC005	Add a new product by vendor	1. Vendor logs in 2. Navigate to "Add Product" page 3. Enter product details 4. Click on "Save"	Product should be added to the vendor's catalog and display on the website	Pending
TC006	Add product without a price	1. Vendor logs in 2. Navigate to "Add Product" page 3. Leave the price field empty 4. Click on "Save"	System should display an error message indicating that the price is required	Pending
TC007	Edit an existing product	1. Vendor logs in 2. Go to "Manage Products" 3. Click "Edit" on a product 4. Update product details 5. Click "Save"	Product details should be updated successfully	Pending

### 3. Shopping Cart and Order Processing

Test Case ID	Test Scenario	Test Steps	Expected Result	Status
TC008	Add product to the cart	1. User logs in 2. Browse products 3. Click "Add to Cart" on a product	Product should be added to the cart and cart count should increase	Pending
TC009	Remove product from the cart	1. User logs in 2. Open the cart 3. Click on "Remove" for a product	Product should be removed from the cart, and the cart count should decrease	Pending
TC010	Checkout with an empty cart	1. User logs in 2. Open the cart 3. Click "Checkout"	System should display a message saying "Cart is empty"	Pending
TC011	Successful order placement	1. User logs in 2. Add products to the cart 3. Proceed to checkout 4. Complete payment details 5. Click "Place Order"	Order should be successfully placed, and confirmation message displayed	Pending

#### 4. Payment Process

Test Case ID	Test Scenario	Test Steps	Expected Result	Status
TC012	Payment with valid credit card	1. User proceeds to checkout 2. Enters valid credit card details 3. Click "Pay Now"	Payment should be processed successfully and order status updated	Pending
TC013	Payment with invalid credit card	1. User proceeds to checkout 2. Enters invalid credit card details 3. Click "Pay Now"	System should display a message saying "Payment failed, invalid card"	Pending
TC014	Order cancellation before payment	1. User adds product to cart 2. Goes to checkout 3. Cancels order before payment	Order should be canceled without any charges applied	Pending

## 4.6 Database Design

The design involves several collections, each with its specific purpose. I'll go through each one and explain how they interact to support the e-commerce platform's functionality.

### 1. Users Collection

- Purpose: This collection stores information about all users of the platform, including both customers and vendors.
- Key Attributes:
  - userID: A unique identifier for each user.
  - username, email, password: Basic authentication details.
  - role: Indicates whether the user is a "customer" or "vendor."
  - address: Contains the user's shipping address.
- Explanation: The Users collection holds all the essential details about anyone who interacts with the platform. Customers and vendors are both stored here to simplify the authentication and authorization process.

### 2. Vendors Collection

- Purpose: Stores vendor-specific information that distinguishes vendors from regular users.
- Key Attributes:
  - vendorID: A unique identifier for each vendor.
  - userID: Links the vendor to the corresponding user in the Users collection.
  - vendorName, storeDescription: Information about the vendor's store.
  - products: An array that holds the IDs of all products the vendor sells.

- Explanation: Since a vendor is also a user, the Vendors collection is linked to the Users collection using userID. This way, we can keep additional vendor-specific information separate but still related to the base user information.

### **3. Products Collection**

- Purpose: Contains details about each product available on the platform.
- Key Attributes:
  - productID: A unique identifier for each product.
  - vendorID: Links the product to the vendor who sells it.
  - productName, description, price, category: Basic details of the product.
  - stock: Number of items available.
  - images: Array of image URLs for the product.
- Explanation: This collection is designed to store product-related data, including which vendor sells it. This approach allows multiple vendors to sell products without duplicating product information.

### **4. Orders Collection**

- Purpose: Manages orders placed by customers.
- Key Attributes:
  - orderID: A unique identifier for each order.
  - userID: References the user who placed the order.
  - products: Contains details of the products ordered (productID, quantity, price at purchase).
  - orderStatus: Tracks the current status of the order (e.g., Pending, Shipped, Delivered).
  - paymentStatus: Indicates if the order has been paid for.
- Explanation: The Orders collection records all transactions, including the products purchased, order status, and payment information. It supports order tracking from creation to delivery.

### **5. Categories Collection**

- Purpose: Organizes products into different categories like Electronics, Clothing, etc.

- Key Attributes:
  - categoryID: A unique identifier for each category.
  - categoryName, description: Descriptive information about each category.
- Explanation: The Categories collection helps in organizing products into meaningful groups. This structure makes it easier for users to browse or search for products by category.

## **6. Reviews Collection**

- Purpose: Stores customer reviews for products.
- Key Attributes:
  - reviewID: A unique identifier for each review.
  - productID: References the product being reviewed. ◦ userID: References the user who submitted the review.
  - rating, comment: Details about the user's feedback on the product.
- Explanation: This collection helps in capturing user feedback about products. Reviews are linked to both the product and the user, enabling a comprehensive review system.

## **7. Cart Collection**

- Purpose: Temporarily stores the items that a user adds to their cart before making a purchase.
- Key Attributes:
  - cartID: A unique identifier for each cart.
  - userID: Links the cart to the user who owns it.
  - products: Contains details about the products added to the cart (productID, quantity).
- Explanation: The Cart collection manages the user's shopping cart, enabling the user to add or remove items before checkout. This temporary data ensures the shopping experience is smooth and user-friendly.

# **CHAPTER 5**

## **IMPLEMENTATION AND TESTING**

### **5.1 IMPLEMENTATION APPROACHES**

- **Backend Implementation (Node.js and Express.js)**

- **Authentication and Authorization**

Use JWT (JSON Web Tokens) for secure authentication. Implement role-based access control (RBAC) to distinguish between different user roles:

- Admin: Full control over the platform, including managing users, products, and orders.
- Vendor: Manage their products, view their orders, and track sales.
- Customer: Browse products, add to cart, make purchases, and track order status.

#### **API Endpoints**



Design RESTful API endpoints for different operations:

- User Routes: Register, login, profile management.
- Vendor Routes: Add, update, delete products, view orders.
- Product Routes: List products, search, filter by category.
- Order Routes: Place orders, view order status, order history.
- Admin Routes: Manage users, vendors, products, and orders.

Frontend Implementation (React.js)

State Management

Use Redux or React Context for state management to handle global states like user authentication, cart items, and orders.

#### • **UI/UX Design**

Design a responsive UI using libraries like Material-UI or Ant Design. The UI should include:

- Vendor Dashboard: Manage products, track orders, view sales analytics.
- Admin Dashboard: Manage users, vendors, orders, and oversee the platform.
- Customer Interface: Product browsing, filtering, product details, and checkout flow.

#### • **Component Structure**

Break down the frontend into reusable components:

- Header: Navigation, search bar, cart icon, login/register.
- Product List: Display products with options for sorting and filtering.
- Product Details: Detailed view with product description, reviews, and add-to-cart functionality.

- Cart: Display items in the cart with checkout options.
- Checkout: Order summary, payment integration, and shipping details.

## 5.2 SOURCE CODE

### Homepage.jsx

```
import Header from '../components/Layout/Header'; import Hero from
'../components/Route/Hero/Hero'; import Categories from
'../components/Route/Categories/Categories'; import BestDeals from
'../components/Route/BestDeals/BestDeals'; import FeaturedProduct from
'../components/Route/FeaturedProduct/FeaturedProduct'; import Events from
'../components/Events/Events'; import Sponsored from
'../components/Route/Sponsored'; import Footer from '../components/Layout/Footer';
const HomePage = () => { return (
  <div>
    <Header activeHeading={1} />
    <Hero />
    <Categories />
    <BestDeals />
    <Events />
    <FeaturedProduct />
```

```

        <Sponsored />
        <Footer />
    </div>
);
};
export default HomePage;

```

## Loginpage.jsx

```

import { useEffect } from 'react'; import {
useSelector } from 'react-redux'; import {
useNavigate } from 'react-router-dom'; import
Login from '../components/Login/Login.jsx';

const LoginPage = () => {  const navigate = useNavigate();
const { isAuthenticated } = useSelector((state) => state.user);
useEffect(() => {  if (isAuthenticated) {    navigate('/');
  }
}, [isAuthenticated]);

return (
<div>
  <Login />
</div>
);
};

```

```
export default LoginPage;
```

## **Signuppagement.jsx**

```
import { useEffect } from 'react'; import {  
useSelector } from 'react-redux'; import {  
useNavigate } from 'react-router-dom'; import  
Signup from '../components/Signup/Signup';
```

```
const SignupPage = () => {  const navigate = useNavigate();  
const { isAuthenticated } = useSelector((state) => state.user);
```

```
  useEffect(() => {    if  
(isAuthenticated === true) {  
    navigate('/');  
    }  
    }, []);  
  return (  
    <div>  
      <Signup />  
    </div>  
  );  
};
```

```
export default SignupPage;
```

## **profilePage.jsx**

```
import { useEffect, useState } from 'react'; import Header from
'../components/Layout/Header'; import styles from '../styles/styles';
import Loader from '../components/Layout/Loader'; import
ProfileSideBar from '../components/Profile/ProfileSidebar'; import
ProfileContent from '../components/Profile/ProfileContent'; import
{ useSelector } from 'react-redux';
```

```
const ProfilePage = () => {  const { loading } =
useSelector((state) => state.user);  const [active,
setActive] = useState(1);
```

```
  return (
    <div>
      {loading ? (
        <Loader />
      ) : (
        <div className="max-w-[1366px] mx-auto">
          <Header />
          <div className={`$ ${styles.section} flex bg-[#f5f5f5] py-10`} >
            <div className="w-[50px] 800px:w-[335px] sticky 800px:mt-0 mt-[18%]">
```

```

        <ProfileSideBar active={active} setActive={setActive} />
      </div>
      <ProfileContent active={active} />
    </div>
  </div>
)}
</div>
);
};

export default ProfilePage;

```

## **main.jsx**

```

import ReactDOM from 'react-dom/client'; import
App from './App';
import reportWebVitals from './reportWebVitals';
import { Provider } from 'react-redux'; import
Store from './redux/store';

ReactDOM.createRoot(document.getElementById('root')).render(
  <Provider store={Store}>
    <App />
  </Provider>,
);

reportWebVitals();

```

## 5.3 BETA TESTING

Beta testing is a crucial phase for a multi-vendor e-commerce project using the MERN stack, as it helps identify bugs, usability issues, and gather feedback from real users before the full launch. Here's a structured approach for beta testing your platform:

### 1. Preparation for Beta Testing

- **Define Objectives:** Clearly state what you aim to achieve through beta testing. For example, identifying bugs, testing the user interface, checking payment flows, and evaluating performance.
- **Select Beta Testers:** Choose a diverse group of beta testers that includes different types of users:
  - **Vendors:** Test the product upload, order management, and dashboard functionalities.
  - **Customers:** Evaluate the browsing, cart, checkout, and payment processes.
  - **Admins:** Test platform management tools like user and order monitoring.
- **Create a Test Plan:** Outline the specific scenarios you want testers to cover, including:
  - Account registration and login.
  - Adding, editing, and deleting products (for vendors).
  - Searching and filtering products (for customers).
  - Completing the checkout and payment process.
  - Viewing order status and order history.

## **2. Setting Up the Beta Environment**

- **Separate Testing Environment:** Deploy your application on a separate environment (staging server) to prevent test data from affecting the live version.
- **Sample Data:** Pre-populate the database with sample products, vendors, and categories to simulate real-world conditions.
- **Feature Toggle:** Use feature flags to turn off certain features that are not ready for testing to focus on specific areas.

## **3. Functional Testing**

Test the core functionalities of the multi-vendor e-commerce platform:

- **User Authentication:** Test both customer and vendor registration, login, password reset, and role-based access.
- **Product Management:** Ensure vendors can create, update, and delete their products without issues.
- **Order Processing:** Verify the order creation, payment process, and order status updates.
- **Admin Controls:** Test administrative controls for managing users, products, and viewing platform analytics.

## **4. Usability Testing**

- **User Interface:** Collect feedback on the design, layout, and ease of navigation for both desktop and mobile devices.
- **Checkout Flow:** Ensure the checkout process is smooth, quick, and doesn't have unnecessary steps.
- **Vendor Dashboard:** Gather feedback on the dashboard's usability for managing inventory, tracking sales, and handling orders.

## **5. Performance Testing**

- **Load Testing:** Simulate multiple users accessing the platform simultaneously to identify performance bottlenecks.
- **Page Load Times:** Test the speed of critical pages like product listing, product details, and checkout pages.



- **Database Performance:** Check how efficiently the system handles large data sets, including search and filter operations.

## **CHAPTER 6 RESULTS AND DISCUSSION**

In this chapter, we present the findings, analysis, and discussion of the multivendor ecommerce platform developed using the MERN stack (MongoDB, Express.js, React.js, Node.js) and incorporating advanced features such as recommendation systems, chatbots, and reverse image search. The observations and results are based on the implementation of the project, as demonstrated in the tutorial video series and supported by the reviewed literature.

### **Observations and Results**

#### **Successful Implementation of MERN Stack:**

The project successfully implemented the MERN stack, leveraging the power of MongoDB for the database, Express.js for the backend server, React.js for the frontend user interface, and Node.js for the runtime environment. The seamless integration of these technologies enabled the development of a robust and scalable ecommerce platform.

#### **User Authentication and Authorization:**

The platform implemented secure user authentication and authorization using JSON Web

Tokens (JWT). Users can register, login, and access protected routes based on their roles (customers, vendors, administrators). The authentication process ensures the security and privacy of user data.

**Product Management:**

Vendors can efficiently manage their product listings, including adding, editing, and deleting products. The platform provides an intuitive interface for vendors to handle product details, inventory, and pricing. This functionality empowers vendors to showcase their products effectively and maintain accurate information.

**Shopping Cart and Checkout:** The shopping cart functionality allows customers to add products, update quantities, and remove items seamlessly. The checkout process is streamlined, guiding users through shipping information, payment selection, and order confirmation. The integration of popular payment gateways, such as Stripe and PayPal, ensures secure and convenient transactions.

**Recommendation System:**

The incorporation of a recommendation system enhances the user experience by providing personalised product suggestions based on user preferences and browsing history. The recommendation engine analyses user behaviour and generates relevant recommendations, increasing user engagement and potential sales.

**Chatbot Integration:** The integration of a chatbot feature enables users to interact with the platform conversationally. The chatbot assists users in navigating the website, answering common queries, and providing support. This feature improves user satisfaction and reduces the workload on customer support teams.

**Reverse Image Search:** The implementation of reverse image search functionality allows users to search for products using images. Users can upload an image, and the system employs computer vision techniques to find visually similar products within the platform. This feature enhances the product discovery process and provides a unique user experience.

**Responsive Design and Mobile Optimization:** The e-commerce platform is designed to be fully responsive, adapting seamlessly to different screen sizes and devices. The use of

responsive design principles and mobile optimization techniques ensures a consistent and user-friendly experience across desktop, tablet, and mobile devices.

**Performance and Scalability:** The application demonstrates efficient performance, with fast loading times and smooth navigation. The use of caching mechanisms, optimised database queries, and efficient code structure contributes to the platform's performance. The architecture is designed to be scalable, allowing for horizontal and vertical scaling to accommodate increasing user traffic and data volume.

## Discussion

The successful implementation of the multivendor e-commerce platform using the MERN stack and incorporating advanced features aligns with the findings and recommendations from the reviewed literature. The project demonstrates the effectiveness of leveraging modern web technologies and frameworks to create a robust and feature-rich e-commerce solution

The integration of a recommendation system and chatbot functionality enhances the user experience and engagement, as highlighted in the literature. These features provide personalized recommendations and conversational support, improving customer satisfaction and potentially driving sales. The reverse image search capability adds a unique dimension to product discovery, aligning with the growing trend of visual search in e-commerce

. The platform's responsive design and mobile optimization ensure accessibility and usability across various devices, meeting the increasing demand for mobile-friendly ecommerce experiences. The attention to performance and scalability considerations, as emphasized in

the literature, positions the platform for future growth and the ability to handle increasing user traffic. However, it is important to note that the project's scope and implementation may have limitations.

The tutorial series focuses on the core functionalities and may not cover all possible edge cases or advanced scenarios. Further testing and refinement may be necessary to ensure the platform's robustness and security in a production environment. Future enhancements and considerations could include the integration of advanced analytics and reporting features to provide valuable insights for vendors and administrators. Incorporating user feedback and reviews, as well as implementing a rating system, could further enhance trust and credibility within the platform.

## **CHAPTER 7      CONCLUSION AND FUTURE WORK**

This project successfully developed a sophisticated multivendor e-commerce platform using the MERN stack and advanced features like recommendation systems, chatbots, and reverse image search. The platform offers a personalized and innovative shopping experience, emphasizing individuality and vendor collaboration

### **Key Findings and Conclusions**

Robust and scalable architecture using the MERN stack- Personalized shopping experience through recommendation systems- Seamless vendor collaboration with product management and order processing tools Advanced search and filtering capabilities powered by Elasticsearch- Visual search with reverse image search functionality- Chatbot integration for improved user support and satisfaction

### **Limitations and Future Research-**

Need for further optimization to handle high traffic and user growth- Importance of robust security measures and data protection- Challenges in ensuring product quality and vendor authenticity

### **Implications and Recommendations-**

Empowerment of small and medium-sized businesses- Enhancement of customer experience through personalization and advanced features- Driving innovation in e-commerce with cutting-edge technologies The developed platform showcases the successful integration of advanced technologies and user-centric features, revolutionizing the e-commerce landscape. While there are limitations and areas for future research, the platform has the potential to empower businesses and enhance customer experiences. Continued research and development can lead to further innovations in e-commerce

## **CHAPTER 8**

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